A Volume in
Managing the Complex

Volume One
Managing Organizational Complexity:
Philosophy, Theory, and Application

Dedicated to Caroline, Alexander, and Albert

... and to Mumsie for staying that extra week!

Managing the Complex: Volume One

Managing Organizational Complexity: Philosophy, Theory, and Application

Edited by

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ISCE Research

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The primary aim of the ISCE Group is to facilitate the conversation between academics and practitioners regarding the implications of complexity thinking for the management of organizations. To support this aim ISCE (which stands for the *Institute for the Study of Coherence and Emergence*) organizes a variety of events and also publishes the international interdisciplinary journal, *Emergence: Complexity and Organizations* (or, *E:CO*; formerly known as *Emergence*) now in its seventh year. The ISCE Group comprises three divisions, namely: ISCE Research, ISCE Publishing and ISCE Events.

ISCE Research is primarily concerned with coordinating the research activities of the ISCE fellows to ensure that each fellow is aware of each other fellow's research to facilitate cross-disciplinary collaboration and synthesis. We also maintain a list of the research publications that emerge from this group of complexity researchers. ISCE Research also provides a legitimate academic home for freelance researchers who would like to apply for government research grants concerning the application of complexity thinking. ISCE Research also maintains a small inhouse research capability which is concerned with a range of different research issues including: the philosophical implications of complexity, the role of language in understanding organizations, coherence in organizations, the simplification of the irreducible, complexity-based tools for policy analysis.

ISCE Events endeavours to bring together complexity researchers from all over the world to discuss the profound implications of assuming complexity for our understanding of such systems. Each event has a particular mode of interaction - either *conference*, *workshop* or *seminar*, as well as a particular thematic focus such as policy analysis, management, philosophy, etc. ISCE Events provide an environment for both furthering the field and diffusing the concepts and tools that emerge from the complexity community.

ISCE Publishing is where much of the content from ISCE Research and ISCE Events is published for wider consumption. The heart of our publishing activities is the international journal *E:CO* which is read by both academics and scholars worldwide. ISCE Publishing also publishes in collaboration with *Information Age Publishing* the *Managing the Complex*, the first volume you are holding in your hands! In January 2005 ISCE Publishing also developed the capacity to publish complexity related books inhouse. We now provide the necessary support for authors of complexity-related literature to get published in a professional and timely manner.

For further information please visit: http://isce.edu, or contact Kurt A. Richardson directly at kurt@isce.edu.

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Series Introduction

Managing the Complex is an ambitious title - and it would be an audacious one if we were not to begin the series with a frank admission: to date few to none of us have a skill set which includes managing the complex. We try various things, we write about others, and we wonder about still others. When a tool, perspective, or technique comes along which seems to evoke success, we emulate it probe it and recoil at the all too often admission that it was situation and context which afforded success its opportunity, and not some quality intrinsic to the tool perspective or technique.

Indeed, if the study of complexity has done anything for managers, and for those who espouse managerial theory, it is in providing a 'scientific foundation' for the notion that *context matters*. Those who preach abstract ideas have then to reconcile themselves to the notion that situation and embodiment matters. Those who believe in strong causality and determinism are left to wrestle with the role of chance, uncertainty, and chaos. Those who prefer to argue that men move history are confronted with the role of environment and affordances, while those who argue the reverse are left to contend with charisma, irrationality of crowds, and the strange qualities we know as emotions.

A series on complex systems has less ambitious goals to contend with than this. Such a series can deal with classifications, and categories, and speak of 'noise' as if it were not the central focus of the problem. *Managing the complex* is about managing noise or perhaps we should say it is about 'dealing with' 'accepting' 'making room for' and 'learning from' noise. The articles in this volume and in the series as a whole will each be considered as noise by some and as gems by others. Situation and affordance will dictate how each is perceived at any given time by any given reader.

The value of the effort lies in the web of ideas it spawns in its readers. If true knowledge is to be found in these pages it lies in the ideas and concepts which the words evoke in you the reader. Our task as authors is to jar your neurons into summoning into being the very adjacent possible which you regard as a 'keeper'. Thus, the series and each of its volumes is like a conference - if you walk away with one or two good ideas and a sense of new opportunities we have done our jobs.

Our authors have accepted this challenge, but theirs is in some ways the easier task. They put pen to paper (okay fingers to keyboard) and left you an artifact to deal with. Whether that artifact will afford you good ideas is your task - much harder than the authors'… but potentially much more rewarding.

We urge you to seek the rewards herein. Set aside the personal complexity you face moment to moment and create enough space for intellectual emergence. Oh dear, we've suggested that perhaps you can manage the complex at least long enough to get something from your reading. Silly of us. Or is it?

Michael R. Lissack
Kurt A. Richardson
March 26th, 2005

Volume introduction

Systemic thinking has been given a well needed injection of enthusiasm in the last 20 years with the growing recognition of the need to acknowledge the complexity of the systems (organizations) we attempt to interact with. Of course, systems thinking itself is not new, tracing back to the days of Aristotle. As a formal science we must give due credit to the likes of Ludwig von Bertalanffy (1969) who set out to develop a full-blown science of systems, but it is really with the development of the computer that widespread interest in complex systems has grown. The systems theorists of 50 years ago did not have the computational resources to rigorously explore the intricate dynamics of complex systems. It is a credit to the systems pioneers that they achieved as much as they did without the use of computers, given what we now know about nonlinearity and intractability. In my opinion, however, (general) systems theory faltered because of the inability to 'test' many of the theories that were put forward. Many of these theories were based on astute observation and reasoning, which, although powerful tools in themselves, severely limit our ability to rigorously explore complex systems' behavior. Computers allow us to build complex representations and perform experiments in a scientific way (it is perhaps ironic, yet fortunate, that the technology that has contributed to so much of modern life's complexities, also offers new means to help understand that same complexity). The exponential growth in available processing capacity has facilitated the development of a 'science' of complexity. The tools developed in the process of doing science become available to a broader community and are available to solve real world problems. However, we must be wary of becoming overly tied to scientific-only discourses. Seeing complexity as just another problem that can be solved through the rigorous application of scientific method(s) misses the point in my view. Undoubtedly, we can learn an awful lot about complexity through science, but there are other avenues open to us in our attempts to understand and manipulate complexity.

I have already mentioned that scarce computational resources would have restricted early systems theorists to speculation rather than science (except in the analytical solution of relatively trivial problems - which by the standards of linear mathematics certainly were not 'trivial'). Another limitation was the focus on scientific discourses. This bias changed in the early 1970s with research from the likes of Peter Checkland and his "systems-based methodology for real-world problem solving" (Checkland, 1972). More recently analytical frameworks such as: the *soft systems methodology* (Checkland, 1981), *system of systems methodologies* (Jackson & Keys, 1984), *total systems intervention* (Flood, 1995), and *systemic intervention* (Midgley, 2000), have been developed

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that explicitly acknowledge the subjectivity and uniqueness of experiencing complexity. These systems-based approaches embrace critique (which is certainly not absent in classical science) and pluralism in which a multitude of discourses are given a hearing, not just mathematical (some might say, rational) approaches. We might classify this move from a discourse monism to a discourse pluralism as a shift from a focus on objectivity to an awareness that subjectivity cannot be removed simply through the application of method, and therefore must be addressed explicitly. Often the distinction quantitative / qualitative is applied (inappropriately in my opinion).

Ken Wilbur (1996), in his excellent *A Brief History of Everything* (if you are still struggling to understand the difference between 'modern' and 'post-modern' then read this book), distinguishes between *exterior* and *interior* understanding (p. 71). An example of exterior understanding is quantitative reductionist science in which we pretend to view the world from the outside - understanding complexity becomes an issue of making really good maps. Interior understanding, on the other hand, relates to our experience of complexity, what it feels like to be embedded in a complex system. Exterior is the natural sciences, interior is the social sciences (when they're not pretending to be natural sciences). In a sense, we can suggest that the recent development in systems thinking is a move from the exterior to the interior, or at least, a more balanced approach to real world systems.

In his recent comparison of complexity and systems theory, Phelan (1999) suggested that "[s]ystems theory is predominantly focused on confirmatory analysis" by which he meant there is a focus on problem-solving and an effort to "improve" the systems of interest - applied science, if you like. Of course, if Phelan was assessing the systems theory of the 1950s and 1960s then he would find that the focus was more on how he characterized complexity theory in 1999 - that complexity theory is exploratory in nature, more akin to a 'blue-sky' research programme rather than applied science. It seems clear that from the 1950s to the 1970s the systems community shifted its focus from 'exterior' to 'interior' in an effort to be able to work with and 'solve' (in a sub-optimal manner) real world problems. It is quite possible that having started out as exploratory in nature, the complexity community is itself expanding and becoming more confirmatory in style. This by no means suggests that 'blue-sky' approaches to complexity will diminish (as it hasn't in systems theory). However, the rapid growth in the literature that attempts to apply complexity principles and ideas to real-world organizations demonstrates that 'complexity' as a body of knowledge has matured sufficiently to allow direct application to real-world problems. Indeed, if this wasn't the case then this particular volume would not have been possible! There is a lot more about complexity that we do not know, and there is a whole lot that we will never know (complexity is as much to do with the limits to our understanding and how we manage those limits, as it is about what we can and do know). Both exploratory research programmes and confirmatory problem solving are needed to allow continued development of complexity as a body of knowledge. The collection of papers

that form this volume contributes to both these different, but by no means independent, endeavors.

The papers in this volume, as the subtitle suggests, have been divided into three sections, namely: philosophy, theory and application. The logic behind this classification is that papers in the philosophical section approach complexity in a very general way. These papers do not necessarily focus on human organizations or networks, but on complex systems in whatever form they are found (although each author was asked to make an effort at drawing some conclusions for organizational management). The theory section contains papers in which the concepts and ideas of complexity have been applied specifically to human organizations. Rather then being specific applications of complexity thinking in real life organizations, they are more concerned with the question: if human organizations are complex systems, then so what? Again, contributors were asked to offer specific advice to the practicing manager. The chapters comprising the last section offer case studies and application of complexity thinking to *real* organizations, not hypothetical ones.

As with all classifications, the three categories are not independent of each other. In a perfect world (from a Platonic perspective at least) everything we see, do, hear, achieve, etc. would be unambiguously labeled and shelved in the correct taxonomic cubby hole. It would also be an easy exercise to take something seemingly new and place it correctly in such a grand scheme. The imperfect real world is not like this - thankfully! Every thing has to be manhandled into our taxonomic cubby hole desk[1], even if it doesn't quite fit. Even though any classification we could ever conceive of would be incapable of providing convenient 'storage' for every 'thing', we do have a tendency to forget that the real world is not so readily classifiable, and that by classifying we simultaneously bastardize reality. The process of classification, with all its shortcomings, does provide a handle on which to grip onto. Such a grip is necessary to initiate the process of thinking. The three categories chosen to divide the chapters in this volume are no different. Some chapters fit rather snuggly in their taxonomic home, whereas others are struggling to co-occupy other cubbies. The point is that the reader should not take these divisions too seriously. If you don't rate yourself as much of a philosopher don't use that as an excuse to skip the philosophy section.

Much of what we do as humans is the result of simplistically representing complexity. One such activity is having one name on the cover of an entity as complex as an edited book. I will discuss the complexity of such a project shortly, but here I'd like to mention the people who freely offered their time and expertise to ensure that the chapters published herein were of a high standard - some of them even contributed a chapter as well! I do, of course, mean the review board. It is very much down to these individuals that it is unlikely that anyone with an interest in complexity and organization will find reading this book a waste of his or her time. The majority of the reviewers also agreed that the review process would be open and not the usual double-blind process familiar in journal publishing. In some cases this led to an ongoing construc-

tive dialogue between reviewer and contributor that was undoubtedly more useful than the anonymous criticism that results from one-way double-blind reviewing. I am therefore very much indebted to:

Alicia Juarrero	Prince George's Community College, US
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Stan Salthe	City College of New York, US
Steve Maguire	McGill University, CA
Willard Uncapher	Network Emergence, US
William Fulkerson	Deere & Company, US

Of course, the quality of the manuscripts submitted ensured that the review board members did not waste their time reviewing poorly written essays. I am thrilled at the overwhelming enthusiasm with which all the contributors approached this project.

Before moving onto the results of the reviewer / contributor system - the book itself - I'd like to spend a moment to offer some of my experiences in 'managing' my first edited book project.

What could be easier than an edited book? The 'editor' (which should really be called a 'manager' - or even better, a 'facilitator') puts together a calling notice for abstracts providing some topical guidelines and some indication of abstract length. A subset of those contributors are invited to submit a full paper, again some formatting guidelines are offered. The contributions are then reviewed by members of a review board which is specifically convened solely for the edited book project. The reviewer feedback is fed back to the contributors who then resubmit their manuscripts after some time to allow for revisions. These 'final'

submissions are then typeset, the typeset pages are checked through by the contributors, final corrections are made, a few introductory words are written by the 'manager' / editor, and "hey presto!" you have an edited book.

If it is so simple then why is this particular volume nearly five months late compared to my original schedule?

What I found at every stage in 'facilitating the emergence' of this volume was that my simplistic view of how the process would unfold did not adequately reflect the true complexity of the project. Even something as simple as having all submissions clocked-in by a certain date is not a straightforward exercise. In a linear view of management this of course is a trivial undertaking. You set a deadline and everyone should meet it. If someone does not meet the deadline then they are cast aside in order to ensure that project Gantt chart does not have to be rewritten. In practice, just about everyone has his or her own excuse as to why they did not meet the deadline. What is important to acknowledge is that every excuse from "my dog ate it" (no, I didn't actually receive this one) to "I am snowed under at work" is perfectly valid. It is up to the 'manager' to provide the 'space' in which accomplishments can happen. In a linear view of management, we would be looking for someone to blame. In a nonlinear view of management, diversity is an inherent characteristic that needs to be understood and embraced (unless you want to drive yourself insane ☺).

A diversity in formatting, especially references, was equally present, despite the rather strict guidelines provided. Again, this is to be expected and can in no way be regarded as a negative reflection on the contributor. In his "Sources of Complexity in Human Systems," Biggiero (2001) lists *gnosiological* complexity and *semiotic* complexity as important sources. Gnosiological complexity refers "to the idea that a system or an environment contains all the information an observer is able to distinguish in it, [but] it depends on the observer's capacity to perceive this information" (p. 9). Semiotic complexity refers to the different meanings we all draw when presented with the same information (although gnosiological complexity suggests we all extract different information in the first place). These sources of complexity are readily apparent in all human organizations (even virtual ones) and so it is no surprise that the same formatting guidelines can result in different formats. This is a feature of a system that has incredible creative capacities, not a flaw (however frustrating it can be at times).

There are many other sources of complexity that I did not foresee when embarking on this project - even I did not follow my own guidelines accurately! Are there general lessons to be learnt? One thing I am sure of, failing to deliver on time does not constitute a project failure (in this case at least). If something was 'wrong' it was my overly simplistic vision, or plan, of how this volume would come together. If the original plan had been executed to the letter then a book of some kind would have certainly resulted. However, its quality would have been comprised for the sake of following a poorly designed plan. This volume really is the result of an emergent process.

A clear lesson, which follows directly from complex versions of management theory, is that project boundaries (if one chooses to organize around the notion of a 'project') must not be reified, they must not be taken too seriously; they need to be allowed to flow. At the same time, they must not be taken too lightly. This is the key challenge for a manager trying to facilitate the fulfilment of certain goals and aims in a complex uncertain system: following guidelines, but at the same time ignoring them. The traditional boy scout motto quickly comes to mind: "be prepared!"

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Notes

[1] For readers unfamiliar with what a 'cubby hold desk' is, a picture of one is available at: http://kurtrichardson.com/cubbyholedesk.jpg.

Postscript

As a child I used to go to sleep looking up at the stars, marvelling at the sheer scale of the night sky and wondering how it all worked. Being asked to comment on complexity is a similar experience, given the sheer breadth of the subject matter and of course the complexity of it. You start to feel as if you need a touch of omniscience in order to qualify for such a job.

So where do you start with such an exercise? Alice was told to "start at the beginning… and when you come to the end, stop", but where is the beginning and how do you know where the end is. In the end I took a leaf out of an old training course on systems thinking, which stated the following rules:

- Cause and effect are not necessarily closely related in time and space;
- There are no right answers;
- The easiest way out will lead back in.

I will start with Elizabeth McMillan in chapter 29, as it fulfils all aspects of the rules stated above. Firstly, the reason it represents a way back in, is that recently the Open University started a new course on their MBA (B830: Making a difference), which has departed substantially from the normal *modus operandi* of the university. The stated intent of the course is that students *implement* something new in their organization and that they reflect on the role of theory in this process. The reason that it is the easiest way back in, is that I am an associate lecturer on this course. Secondly, at a recent gathering to discuss the course, a great deal of anxiety was expressed at the lack of guidelines and structure for the course. The response was "we do not know where this will lead, all we know is that the path will emerge as we move forward", in effect stating that there were no right answers. For me, this was music to my ears, but others struggled with the ambiguity. Thirdly, it never occurred to me, due to my lack of knowledge of the context behind the statement, that this course could have been the outcome of the changes described in chapter 29. But what is interesting is that the cause and effect are separated by quite a substantial gap in time and space.

This of course makes life much easier, as I now have a unique contribution to make to the task undertaken by this book, in that I can verify that the principles of complexity work. Everything we have been talking about for all of these years and the phenomena we have discussed and articulated have come together in this example, at this point in time. None of this was predictable in its conception and how strange that I should be writing now, at this time, and be able to show a living example of the interrelatedness and emergent proper-

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ties of a system.

This, I think, is articulated by Ashmos, *et al*., (2002) in Michael Lissack's comment on page 467, "Encouraging connections through participation is essentially an exercise in complexifying everyday life in an organization, because it encourages people to enter unknown areas, unfamiliar roles, new patterns." And again in, "complexity is about the behavior of interacting entities, and the evolution of collective structure and behaviors over time." (Chapter 23, Peter Allen, Jamie Boulton, Mark Strathern and James Baldwin).

When considering what is common about complexity, we seem to agree broadly that it is about emergence, interaction and the dynamics of interaction. Where we seem to depart, or fragment, is in the discussion of how best to look at the phenomena. I have always searched for a philosophy which allows these differences to coexist peacefully, and until recently, found and participated in many of the discussions relating to the ontology in use, whether a Leibnizian approach or a Lockean approach was better or worse, whether Kant had the answer or Hegelian inquiry did, or if indeed Singer had the answer. The answer I think has come in the development of new philosophical approaches, which is logical when one considers that philosophy develops to explain the reality of the time, and in complexity we are defining a new reality or re-defining our current reality. But where is this new philosophy that we need so badly? Philosophy as a subject worldwide is in crisis, so where can we go to find that explanation and guidance? I think there are two places we can go: one exists within the body of complexity itself, with books such as this, where philosophy is developed from within, and the second exists in a new breed of philosopher such as Alain Badiou.

Philosophy, as can be seen clearly from the first five chapters, is fundamental in driving understanding. Philosophy governs choice, it articulates position and it indicates direction; it is our rudder and our start position for debate. The reason I mention Alain Badiou is simply because he has articulated a philosophical position, which not only challenges all of the traditional models, but also articulates a position I believe closely relates to that of many of the authors in this book. I believe that there is no 'right answer' philosophically, and that the truth is in differences. Badiou's *L'etre et l'evenement* is alien to almost all branches of existing philosophy. It raises the subject of "multiple multiplicities" and the concept that situations do not necessarily have mutually exclusive identities. I see this as a step towards the quantum physicists and a step towards the findings in complexity science. This is a subject discussed by Kurt Richardson in chapter 2, which I feel supports his pluralistic position.

I am constantly aware when entering into these discourses, and from the experiences of COMPLEX-M, (an email address, which I am sure many will have come across in the last few years), that almost any position you wish to take on a subject can lead to pages of dialogue. I am, therefore, not going to go any further on philosophical matters relating to complexity, other than to say that it adds substantially to the book, and looking forward might justify a literary lineage of its own in the coming years.

On the matter of how we research complexity and make our new-found knowledge accessible, I feel we have a paradox. The broad nature of complexity as a natural phenomenon allows contributions on the subject matter to be made from almost any arena of knowledge, and it is for this reason that it is so powerful; paradoxically, it is precisely for this reason we find it so difficult to apply or develop new approaches, tools, techniques, explanations etc. What is now changing as the body of knowledge and our understanding of it grows, is the change in direction, from having to prove that the phenomena exists and how it exists, to how we may actually make use of it. The development of this book from philosophy, through theory, to application, is a logical one. There are many authors on the world stage at the moment writing about complexity and offering a 'new way' of doing things. As a practitioner, I am duty bound to read these 'new ways', in case a client were to ask a question on the subject. I am, however, frequently disappointed by many of these books, as I do not see them displaying the depth of experience and research that is reflected in this book. I share Buck Lawrimore's sentiment when he states, "but I have yet to find one (book) which attempts to use Complexity to understand and manage all the key variables and challenges which confront a typical business or organizational manager" (p. 127).

The question this then poses is 'why?'. Is it that the science is still too young and developmental and there are too many unanswered questions, or is it that the science struggles to express itself? For complexity to grow and become more widely accepted as the way we view the world, two things need to happen. Firstly, people need to understand the science, and secondly, people need to be able to use the science. I feel that it is our challenge over the coming months and years, to seek methodologies and alliances that allow us to express what we are seeing and discovering, in ways that people can understand and relate to. We must not forget that it has taken forty years to persuade people that driving their car is contributing to the melting of the polar icecap and raised sea levels. Again, cause and effect are not necessarily closely related in time and space, and this makes the challenge difficult. Our search for 'solutions', as a global paradigm, prevents us from accepting that there are no right answers; right answers are invariably contextual and transient.

This book should not be regarded as just a book, but as an emergent collaboration, and as with emergent phenomenon, we cannot predict the effect that it will have; only that it will have an effect. Also, we must not allow ourselves to be constrained in our vision of what is possible; if we have learnt one thing from complexity, it is the vast range of "potential potentialities" there are.

As Kurt Richardson states in chapter 2, "If the argument that the Universe is a complex system holds then 'We must … keep our options open and we must not restrict ourselves in advance.' (Feyerabend, 1975)."

There will be increasing pressure to compartmentalise the science and to establish commonly agreed principles. This, as they say, is 'human nature'. The 'established approach' helps to focus research, aid the education of the science and improve its adoption rate. However, it also severely constrains the adop-

tion of new ideas, as we have then to work hard to justify why new research changes the established status quo. Much of today's scientific establishment only sponsors certain types of research, and will only accept new findings after a lengthy validation process and a substantial burden of proof. Unfortunately, as can be seen in examples such as climate change, or even my own involvement in Open University, proof is a hard commodity to find in complexity, and open-ended experiments are difficult to fund.

I feel we must choose to accept complexity as an evolving stream of consciousness, which over time will grow to explain what is inexplicable today. As with all journeys, there will always be another hill to climb once you reach the top of this one.

About the contributors

Peter Allen

Prof Peter Allen is Head of the Complex Systems Management Centre in the School of Management at Cranfield University. He teaches complexity on the MBA at Cranfield and contributes to other teaching courses in several universities. His research is directed towards the application of the new ideas concerning evolutionary complex systems to real world social, economic and management problems. He has a Ph.D. in Theoretical Physics, was a Royal Society European Research Fellow 1970-71 and a Senior Research Fellow at the Université Libre de Bruxelles from 1972-1987, where he worked on the theory of complex systems with the Nobel Laureate, Ilya Prigogine. Professor Allen has worked for 30 years on the mathematical modelling of change and innovation in urban, social, economic, financial and ecological systems, and the development of integrated systems models. He has written and edited several books and published over 200 articles in a range of fields including ecology, social science, urban and regional science, economics, systems theory, and physics. He has been a consultant to the Canadian Fishing Industry, Elf Aquitaine, the United Nations University, the European Commission and the Asian Development Bank. He has managed a number of large European and UK research contracts, including the NEXSUS Network (www.nexsus.org).

James Baldwin

James graduated from the University of Hull in 1999 with a first class honours degree in Psychology. He was subsequently awarded a Ph.D. scholarship from the University of Sheffield's Department of Mechanical Engineering to research the sustainability of complex systems, with a particular emphasis of manufacturing in South Yorkshire. This led to a Postdoctoral Fellowship (2004) awarded by the Economic and Social Research Council, UK. James joined the Management School in January 2005 as a Lecturer in Strategic Management. He has written and contributed to 25 research papers for conferences and workshops, book chapters and journal publications. His specific research interests include sustainable manufacturing and industrial ecology; uncertainty, risk and diversity in management decision-making; evolutionary systems applied to manufacturing; experimental computer modelling and simulations; manufacturing classifications, particularly cladistic classifications; practical tools for management for use during organizational change. His teaching interests include project management, risk assessment, sustainable operations management and industrial ecology. James also serves on the Editorial Board of the new international scientific referee journal *Progress in Industrial Ecology*, and has also participated in the review process on special issues for both the *Journal of Cleaner Production* and *Benchmarking: An International Journal*. James is a member of the scientific committee of the 11th Annual International Sustainable Development Research Conference with special streams on Industrial Ecology and European Environmental Policy.

Ken Baskin

Ken Baskin, an ISCE Fellow, writes, lectures, and consults on the benefits of thinking differently about the things we know best. In his book, *Corporate DNA: Learning from Life*, for example, he focused on how managers can increase innovation, productivity, and market share by thinking about their organizations as if they were living things evolving in market ecosystems. He has published articles in such journals as *E:CO*, *Emergence*, *The Manchester Review*, *Organizations & People*, *The Physician Executive*, and *Innovative Leader*. In addition, he has spoken before audiences at several ISCE and Society for Complexity in Psychology and the Life Sciences conferences, a RAND Corporation workshop on complexity in public policy, and a 1999 seminar on complexity management in Tokyo. Recently, Baskin has been exploring and writing about the integration of complexity thinking insights with those of narratology. This work arose from an ISCE-funded research project he completed in 2002, which examined the dynamics of storytelling in work group cultures at three American hospitals. His corporate experience includes work as an executive speech writer at Bell Atlantic (now Verizon), Sun Company, and the U.S. Department of Energy.

He has also run his own public relations firm, with clients including Monsanto, ITT, and Merck. Baskin earned a Ph.D. in English Literature from the University of Maryland. He now lives in Philadelphia, PA with his wife.

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Jean Boulton is a Visiting Fellow with the Complex Systems Management Centre. She delivers the MBA elective 'Complexity in Management' which focuses on the implications of complex systems thinking to strategy development and organization change. Jean is also Managing Director of Claremont Management Consultants Ltd, established in 1994 and specializing in organization change and strategic organization development. Previously she was Practice Director of Organization Change for Hay Management Consultants Ltd. and prior to that she was Head of Engineering Operations for British Aerospace Regional Aircraft Ltd. Jean has a Ph.D. in theoretical physics from Cambridge University and a first degree in physics from Oxford University and a MBA from Cranfield. Her physics background combined with many years experience of organization change put her in a strong position to look at the implications of science-based theories as applied to management thinking.

Paul Cilliers

Paul Cilliers is professor in Philosophy at the University of Stellenbosch, South Africa. His research is focused on the philosophical and ethical implications of complexity. He is the author of *Complexity and Postmodernism* (Routledge, 1998) and he also has a degree in Electronic Engineering.

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Dr. Eric B. Dent is presently Dean and Professor, School of Business, University of North Carolina, Pembroke. He is committed to an interdisciplinary research agenda that has resulted in publications in behavioral science, complexity theory, systems science, education, consulting, history, communications, spirituality, organization development, and philosophy journals. Dr. Dent is a consultant to Fortune 500, government and non-profit organizations as well as an invited speaker to national audiences. He has received various awards for his scholarship, teaching, and service. Prior to joining academia, Dr. Dent worked as a computer scientist with IBM. There he worked on state-of-the-art satellite communication technology.

Frans M. van Eijnatten

Frans M. van Eijnatten, Ph.D., is Associate Professor at the Research School for Operations Management and Logistics at the Department of Technology Management, Eindhoven University of Technology, the Netherlands. His main research interest is in Socio-Technical Systems Design, an ambition he pursued for almost 20 years by initiating and coordinating Ph.D. design-oriented action research projects in R&D and information systems design. He produced several English-language reviews on the subject as well as a comprehensive bibliography of the paradigm. Currently, Dr.

Van Eijnatten is exploring the implications of Chaos and Complexity theories for Socio-Technical Systems Design and Organizational Renewal (i.e. 'Chaordic Systems Thinking' - CST). He coedited two guest issues about CST for the *Journal of Organizational Change Management* and *The Learning Organization*, and published an overview of Chaos and Complexity in Organization and Management in the *Revue Sciences de Gestion*. He is founder and coordinator of the European Chaos and Complexity Network ECCON, and convenor for the annual meetings of this network. He participated in several European-Union-funded research and development programs (4th, 5th Framework: Esprit, Brite-EuRam, IST, IMS), and is reviewer for the 6th Framework ('New and Emerging Science and Technology' – NEST, Pathfinder activity), European Commission, Brussels. He served as an invited expert to Framework 6 Integrated Project: European Collaborative Networked Organizations Leadership Initiative (ECOLEAD). Dr. Van Eijnatten chairs the NOSMO Socio-Cybernetica working group, based in The Netherlands. Recently, he spent two months as a visiting research fellow at Yokohama National University, Graduate School of Environment and Information Sciences, Eco-Technology System Laboratory, Yokohama, Japan.

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James Falconer is president of Eagna Research and Consulting, an independent business thinking concern. He has spent nearly twenty years working in and with private-sector organizations in the high technology, financial services, and professional services sectors, as well as with public sector agencies. His role has typically been to help those organizations navigate through improvement and change, employing a holistic and highly collaborative approach that typically involves strategic realignment, process improvement, and / or information technology integration. He is also an active researcher in organizational domains, and his focus is mainly on concepts such as knowledge, strategy, culture, community, complexity, change, and form in the context of the postmodern business landscape. He has had several papers published in academic journals and has spoken at numerous conferences internationally. He holds a B.A. in philosophy from the University of Toronto, a B.E.S. in urban planning from the University of Waterloo, and an MBA from York University.

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Having completed an advanced degree in Industrial Engineering and Management Science at the University of Technology in Eindhoven, The Netherlands, Maarten was employed as coordinator, trainer and researcher of a change initiative focussing on the culture of a Dutch industrial company. Now he works in the field of quality management for a small coatings company in the Netherlands.

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Carlos Gershenson is studying a Ph.D. at the Centrum Leo Apostel of the Vrije Universiteit Brussel, Belgium (2002-), on the 'Design and Control of Self-organizing Systems'. He holds a MS.c. degree in Evolutionary and Adaptive Systems, from the University of Sussex (2001-2002), and a B.Eng. degree in Computer Engineering from the Fundacion Arturo Rosenblueth in Mexico. (1996-2001). He studied five semesters of Philosophy at UNAM, Mexico (1998-2001). He has been an active researcher since 1997, working at the Chemistry Institute, UNAM, Mexico (1997-2001), and a summer at the Weizmann Institute of Science, Israel (1999). He has about thirty scientific publications in journals and conference proceedings. He has given more than thirty presentations at conferences or research group seminars. His research interests include self-organizing systems, complex systems, artificial life, cognitive sciences, philosophy of mind, artificial societies, paraconsistent logics and virtual laboratories. He is a contributing editor to *Complexity Digest* and Book Review Editor of the *Artificial Life* journal. He has taught different courses at undergraduate and graduate levels in Mexico. He has worked as a systems consultant, software and web developer. He periodically writes popular articles for scientific divulgation.

Dawn R. Gilpin

Dawn Gilpin has been working in the communication field for over ten years as an independent consultant, previously based in Italy and now in the United States. She earned her M.A. in

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Jeffrey Goldstein

Jeffrey Goldstein, Ph.D., is Full Professor, School of Business, Adelphi University, Garden City, NY, as well as Associate Clinical Professor, Derner Institute for Advanced Psychological Studies also at Adelphi University. He is also Director of Research for the School of Business and directs the School's Executive-in-Residence Program. Prof. Goldstein has also taught at Rutgers University, as well as courses at Columbia University, NYU, and in 2000 was a Visiting Professor at the NATO Advanced Studies Institute on Nonlinear Dynamics held in Moscow, Russia. Prof. Goldstein is one of the pioneers in the application of complexity theory to the study of organizations and leadership. His book on that subject, *The Unshackled Organization*, was hailed by *Industry Week* as a "fascinating vision." Dr. Goldstein is the author of over 80 scholarly articles and has lectured and given workshops throughout the world at leading businesses and universities. Dr. Goldstein is currently one of the editors-in-chief of the new journal *Emergence: Complexity and Organization* and is a trustee and past- president of the Society for Chaos Theory in Psychology and the Life Sciences which publishes the internally recognized journal *Nonlinear Dynamics, Psychology, and the Life Sciences*. He is also a member of the Institute for the Study of Coherence and Emergence and in that capacity played a key role in the founding of its ground-breaking journal *Emergence*, the first such publication devoted solely to the application of the sciences of complex systems to human organizations.

Francis Heylighen

Francis Heylighen is a research professor at the Free University of Brussels (VUB), where he directs the Evolution, Complexity and Cognition (ECCO) research group. He has worked during most of his career for the Fund for Scientific Research-Flanders, first as research assistant, then Post Doc, and finally tenured Senior Research Associate. He received his M.Sc. in mathematical physics in 1982, and defended his Ph.D. in 1987, on the cognitive processes and structures underlying physical theories. He then shifted his research to the self-organization and evolution of complex, cognitive systems, which he approaches from a cybernetic perspective. He teaches an introductory course on this topic at the VUB, and has several Ph.D. students working on these subjects. Heylighen has authored some 90 scientific publications in a variety of disciplines, including a monograph and four edited books. Since 1990 he is an editor of the Principia Cybernetica Project, an international organization devoted to the computer-supported collaborative development of an interdisciplinary knowledge network. He created (and still administers) the project's website in 1993, as one of the first complex, interactive webs in the world. Since 1996 he chairs the Global Brain Group, an international discussion forum reflecting on the emerging information society. He is editor-in-chief of the *Journal of Memetics*, which he cofounded in 1996, and is a member of the editorial boards of the *Journal of Happiness Studies*, and the journals *Informatica* and *Entropy*.

Liu Hong

Liu Hong is Professor of Management and chair of Department of Business Administration of the School of Business, Nanjing University. Liu received his Ph.D. from Wuhan University of Technology and his Master's degree from Hefei University of Technology. Dr. Liu recent research focuses on managing complexity, including applying complex systems theory to organizational change management, organization design, multi-agent behaviors, and human resource management. Dr Liu has published five books, two international conference proceedings and about 100 articles including coauthorships. His two recently books are *Economic Chaos Management: Theory, Methodologies and Applications* (Bejing: Chinese Development Press, 2001, in Chinese, awarded

the second prize of Excellent Social Science Achievements by Jiangshu Province Government in 2003) and *Principles and Methodologies Based Chaos Theory of Economic System Forecasting* (Bejing: Science Press, 2004, in Chinese).

James K. Horn

James Horn teaches history and philosophy of education at Monmouth University. During the late stages of a former career as a K-12 educator, he was selected to participate in one of the learning institutes that is described in his contribution to the present volume. Since the early 1990s, he has presented and written on the subject of autonomous learning and learning systems. Currently he is working on a research methodology piece that uses the metaphors and science of complexity to advance qualitative empirical research. His most recent article, "The Embodiment of Learning", will appear later this year in a special issue of the journal, *Educational Philosophy and Theory*.

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Robert G. Jones is Professor of Psychology at Southwest Missouri State University (SMSU). He received his Ph.D. (1992) in industrial / organizational (I/O) psychology from Ohio State University after a 'first' career in banking and music. During his career as an I/O psychologist, he has dealt with a broad range of research and practice questions, mostly relating to psychometrics in selection, performance assessment, and management development. His recent work centers on applications of basic research on emotive perception to measurement and management of behavior in individuals and groups. With his students, he has addressed these issues in numerous applied and scholarly settings, including assessment centers, performance management systems, service training programs, selection test development, and team and leadership development. Bob has served as Book Review Editor for *Personnel Psychology* and as Acting Department Head for the SMSU Department of Psychology. He lives in Springfield, MO with his Wife and two Sons, and currently serves on the Springfield City Council.

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Dr. Lissack is the director of the Institute for the Study of Coherence and Emergence (ISCE) and served for five years as the editor-in-chief of ISCE's journal, *Emergence*. His ongoing research focuses on the use of the concept of coherence to develop a complexity based theory of management. Dr. Lissack has taught economics as a lecturer at Williams, research techniques at Henley Management College (UK), business strategy at IMD (Switzerland), complexity at the London School of Economics, and business ethics at the Rotterdam School of Management, Vanderbilt, and Keele (UK), as well as run nine international conferences on the topics of complexity, management, healthcare, entanglement and ethics. His numerous books and speaking engagements have had a management and philosophy focus. In 2000, Dr. Lissack founded Knowledge Ventures Inc. an educational tools software company which publishes the Learners Library - a research tool for academics. *Worth* magazine recognized Dr. Lissack in 1999 as one of "Wall Street's 25 Smartest Players" and again in 2001 as one of the 100 Americans who have most influenced "how we think about money."

Pavel O. Luksha

Pavel Luksha is a head of a Working Group on Socio-Economic Studies at the State University - Higher School of Economics, Moscow, Russia. He received his Masters degree in Economics, and later pursued post-graduate study at the same University. Pavel has taught at the Higher School of Economics, and conducted courses in management disciplines in other institutions. He has been, and remains, involved into a number of research projects that bridge complexity science with social sciences. Pavel worked for international and domestic management consulting companies such as Accenture, Arcadis Euroconsult, ALT R&C, and also acted as an external consultant in a number of domestic and international development projects. Apart from that, he has been actively involved in economic journalism with a number of national journals and news agencies. Since 2001, Pavel works within a leading Russian automotive manufacturer, Severstal-Auto. In 2003, he held the position of the Chief Controlling Officer for the company.

Simon Marvin

Simon Marvin is Professor and lead-director of SURF. Simon is an expert on changing relations between neighborhoods, cities, regions and infrastructure networks in a period of rapid technological change, environmental concern and institutional restructuring. Simon's research has been funded by the ESRC, EPSRC, the European Commission and a number of commercial funders and public agencies. He has published widely on cities and technological change. Recent coauthored books include (2001) *Urban Infrastructure in Transition: Networks, Buildings and Plans*, Earthscan; (2001) *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition* Routledge, London. Recent research work has focused on the development of prospective approaches to understanding urban and regional futures. This work has been funded by the DTI Foresight programme, Treasury Placement Scheme, ODPM New Horizons programme.

Elizabeth McMillan

Elizabeth is a Senior Research Fellow at the Open University and an experienced and qualified management development consultant who worked for many years as a senior manager in both the private and public sectors. She specializes in leadership, creativity and the management of change, and is an acknowledged expert in the exploration of all the strategic and operational issues that organizational change engenders. Her book *Complexity, Organizations and Change* was published by Routledge in March 2004. She is a Fellow of the Chartered Institute of Personnel and Development, a founder member and a Director of the UK Complexity Society, and a member of the British Academy of Management.

Will P. Medd

Following a B.Sc. Hons. in Sociology and Social Policy (1992-1995) Will undertook a Ph.D. in the Department of Sociology, Lancaster University (1995-1999) exploring the applicability of models from complexity science for sociological analysis, through a case study of partnership working in social welfare. Will's post-Ph.D. research began at the University of Salford, in the Institute for

Public Health Policy and Research, working on an action-learning project to build capacity for tackling health inequalities through local strategies. In 2002, still at the University of Salford, he joined the Centre for Sustainable Urban and Regional Futures (SURF), to work on an EU funded project looking at the role of intermediary organizations in sustainable water management. Will has now returned to Lancaster as a Research Associate in the Department of Sociology and newly established Centre for Sustainable Water Management to work on developing the sociology of water while maintaining his interest in complexity science methodologies. Recent publications on complexity include: "Complexity and Social Measurement" (in Kempf-Leonard K., *et al.* (eds.) (2004) *Encyclopedia of Social Measurement*, San Diego: Elsevier Science), "Complexity and the social world", (in Williams, M. and T. May (eds.) (2002) *International Journal of Social Research Methodology*, 5(1): 71-81.), "What is Complexity Science? Toward an Ecology of Ignorance," (K. Richardson and P. Cilliers (eds.) (2001) *Emergence: Journal of complexity issues in organization and management*, 3(1): 45-62). He also edited a special edition on "Complexity Science and Social Policy" for the electronic journal *Social Issues* in 2001.

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Ronald C. Murray

Dr. Ronald Murray's career has included organization consulting, public and private sector management, university teaching, and military service. Following seven years in the Canadian military Dr. Murray returned to university to pursue graduate studies at Queen's University at Kingston, Ontario. His doctoral studies focused on developing a humanistic approach to the use of General Systems Theory concepts in social science by interpreting them through the philosophical insights of existential phenomenology. He then applied these systems concepts to examine the evolution of international maritime relations. After obtaining his Ph.D. he taught in the School of Public Administration at Queen's for several years. Dr. Murray then spent 12 years in the Ontario Public Service in a variety of management positions with leadership responsibilities in organization development, project management, strategic planning and management, and the management of information technology and systems. Later he consulted with several organizations, designing and leading their organization development and change management projects to a successful completion. Based on his academic, management, and consulting experience Dr. Murray developed a systemic approach to organizational change management that overcomes the fragmentation that is created and exacerbated by partial and incremental change management. This comprehensive, integrated, and strategic approach to managing Large Scale Organizational Change is grounded in the philosophical insights of existential phenomenology and the organizational insights provided by complexity theory concepts.

Carole S. Napolitano

Carole Napolitano is President and founder of Synergies, a firm that provides consulting services in leadership, executive coaching, and organizational effectiveness. Skilled in designing and facilitating learning experiences for managers, leaders, and teams, Napolitano has worked with a variety of public and private sector organizations. A few of her many clients include NASA, Freddie Mac, the Federal Judicial Center, the World Bank Group, FEMA, the University of Maryland, the U.S. District Court of Nevada, the USDA Forest Service, and Xerox Corporation where she coauthored several internal publications and functioned as lead designer for the corporate first level manager program, *Navigating Planet Xerox.* For a period of eight years (1994 – 2002), Napolitano served as Executive Consultant for the Seaboard Region of State Farm Insurance Companies; she currently coaches members of the executive team at Baltimore Gas & Electric. A focus of her recent work has been the use of Appreciative Inquiry to assist individuals and systems engage new possibilities for their organizations and themselves. Napolitano holds a Masters degree in English from the University of North Carolina at Chapel Hill and has pursued advanced studies

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Gowri did her bachelors in Bombay University, India and completed her Masters and Doctoral work in Rutgers University in New Jersey. She taught in Southwest Missouri State University from 1993-2001 in the department of psychology. Currently Gowri teaches in the School of Education at the State University of New York. Her dissertation involved synthesizing the theories of Vygotsky and Piaget in the area of spatial development in girls and women. Her past research has included gender and cultural issues in development, cognitive development and developmental theory, critical literacy, multicultural issues in education and teaching issues in psychology. Gowri has recently been involved in children's development when confronted with disasters like AIDS, war and natural calamities, and has been working on a project to explore changes across generations among Indian immigrants in the United States. She has published in a number of peer-refereed journals in psychology, education and anthropology.

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Julie Richardson is a writer, consultant and strategic policy advisor. She has worked for over 15 years in the broad area of sustainable development in a wide range of organizations and countries in Europe, Africa, Asia and Latin America. Previously she worked as Principal Sustainability Advisor for Forum for the Future; as a policy advisor to the Prime Minister's Strategy Unit in the UK government and as a lecturer in environmental economics at the Universities of London and Sussex. She has published widely in the field of sustainable development, corporate responsibility and new approaches to organizational change. She has recently completed a postgraduate program in holistic science at Schumacher College in Devon, England. Her thesis "Wholeness and Health in the Living Organization" investigated the links between holistic health and contemporary science applied to throw new light onto organizational dynamics. Her contact email address is Julie.richardson@blueyonder.co.uk.

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Kurt is currently the Associate Director of the ISCE Group, and the Director of ISCE Publishing. He has Adjunct Professorship positions at Royal Roads University, Canada (where he teaches a course on research methods) and the University of Technology, Sydney, Australia. Kurt is the Managing / Production Editor for the international journal *Emergence: Complexity and Organization*, and serves on the review boards of *Systemic Practice and Action Research*, *Systems Research and Behavioral Science*, and *Tamara: Journal of Critical Postmodern Organizational Science*. He has also reviewed papers for *Nonlinear Dynamics, Psychology and the Life Science*, and the *Journal of Artificial Societies and Social Simulation*. Kurt has a B.Sc. in Physics, a M.Sc. in Astronautics and Space Enginneering, and a Ph.D. in Physics, as well as being a Chartered Physicist and a Chartered Scientist. His current research interests are concerned with a range of issues surrounding the study of complex systems, including: the simplification of complexity, implications for policy analysis, relationship between systems theory and complexity theory, and the philosophical implications of assuming complexity. Before joining ISCE Kurt was a satellite communications consultant for the British government.

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Duncan Robertson is a lecturer in strategic management at Warwick Business School, UK. He has held lecturing posts at several colleges of the University of Oxford, as well as visiting posts at the Santa Fe Institute (New Mexico), Sun Yat-Sen University (Guangzhou, People's Republic of China), and The Wharton School of the University of Pennsylvania (Philadelphia). His research centers on the dynamics of competitive strategy; competition in high-velocity and turbulent

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Stanley N. Salthe

Currently a Visiting Scientist in the Biological Sciences at Binghamton University, I'm retired from Biology at the City University of New York. My connections at Binghamton have been more with the Systems Science group of the Engineering Department. Having long standing connections to both Systems Science and Semiotics, I'm now involved in the current revival of Natural Philosophy (Philosophy of Nature), a discourse that withered away (except in Thomistic philosophy and Marxism), at the turn of the last century. Its role is systematic, not critical, aimed at constructing a contemporary mythology (sensu ethnology) based in scientific knowledge. See my WEB pages at http://www.nbi.dk/~natphil/salthe/, as well at http://www.harmeny.com/twiki/bin/view/Main/SaltheResearchOnline. Recently I've become more involved with thermodynamics as a way of grounding our mythology in the Big Bang, as in the hierarchical framework: {physical world {material world {biological world {sociocultural world }}}}. This has interested a number of ecologists in my work. As well, I have in the last decade joined Koichiro Matsuno in an inquiry into Internalism, an attempt to construct an alternative perspective on the world to that taken within classical science, which we identify as 'externalism'. My most recently authored book, *Development and Evolution: Complexity and Change in Biology* (MIT Press, 1993) presents what is still my general conceptual framework. Previous books are *Evolutionary Biology* (Holt Rinehart & Winston, 1972) and *Evolving Hierarchical Systems: Their Structure and Representation* (Columbia University Press, 1985).

Krishnankutty Sathian

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Barbara Simpson

Barbara Simpson is a Senior Lecturer in Organization Studies at the University of Strathclyde Graduate School of Business in Glasgow. She holds a Ph.D. in Management and an Honours degree in Physics. Her current research interests are broadly located within the field of organizational learning and change, but with a special focus on dynamic processes of innovation. The generative potential of human activity and interactivity is central to her understanding of emergent novelty in social / organizational contexts. Her work in this area is informed by more than 20 years of practical experience as a scientist, science manager and consultant in innovating organizations. In addition, her early training in physics, especially modern physics, continues to weave through and shape her perspective on the world. Barbara's recent publications have focussed on the transformational change experiences of public good science organizations in New Zealand. She has also been involved in an ongoing study of innovation practices in small, knowledge-intensive enterprises.

Mark Strathern

Mark Strathern is a Research Fellow with the Complex Systems Management Centre. At present he is part of a team with the University of Sheffield undertaking a three-year project "Modelling the Evolution of the Aerospace Supply Chain" which aims to produce a framework for Evolution Management and is designed to be a core research project in the continuation of the NEXSUS Priority Network. Recently he was part of the team on the ESRC NEXSUS project to understand and model sustainability in complex socio-economic networks. He has also recently been involved with the modelling and teaching of sustainability within the EU fishing industries, and has a continuing collaboration with the Tyndall Centre working on formal and mathematical methods for use in the climate change arena. Mark has worked for over a decade at Cranfield modelling complex systems, particularly complex socio-economic systems. Amongst other projects, he has been involved in the modelling of financial trading systems, banking, the effects of climate change, Senegal, and the water quality in the Rhone valley. He also has an ongoing interest in object oriented software development for concurrent and distributed systems. Before joining Cranfield Mark worked for a number of years as a consultant in Information Systems and has held positions in accountancy and marketing. Mark has a degree in mathematics and an ongoing Ph.D. in modelling adaptability.

Andrew Tait

Andrew Tait is currently cofounder and Chief Technology Officer of Idea Sciences, a Virginia-based software and consulting firm specializing in the creative use of technology to improve organizational decision-making. Idea Sciences' mission is to 'package' powerful decision-making theories and processes in a way that makes them accessible and practical for day-to-day decision-making. In support of this mission, Andrew has designed commercial, off-the-shelf, solutions for strategic planning, performance improvement and conflict management. His work in this area has led to numerous consulting and training relationships with major commercial and government organizations. Prior to forming Idea Sciences, Andrew held various commercial (technology consulting), government (defence) and academic (management) positions. Andrew's research interests include: performance improvement, electronic voting, virtual communities; conflict management and; security and privacy in complex systems.

Shann Turnbull

Dr. Shann Turnbull is the Principal of the International Institute for Self-governance based in Sydney Australia and a Fellow of the Institute for International Corporate Governance and Accountability at the George Washington University Law School. He is an Honorary Associate of the Asia Pacific Research Institute at Macquarie University. Shann graduated in Tasmania as an Electrical Engineer in 1957, obtained a B.Sc. from the University of Melbourne in 1960, and a MBA from Harvard in 1963. He obtained a Ph.D. from Macquarie University, Sydney for developing a methodology for analyzing complex organizations. Two of his research papers at www.ssrn.com were selected for inclusion with the seminal contributions of leading scholars in the Corporate Governance volume

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Raj Veliyath is a Professor of Management at the Coles College of Business at Kennesaw State University. Raj's Ph.D. is from the Katz Graduate School of Business at the University of Pittsburgh. He also has an MBA from the Indian Institute of Management Calcutta and a Bachelors degree in Engineering from the Indian Institute of Technology at Kharagpur. He has taught at the University of Pittsburgh's Katz Graduate School of Business, the Kellogg Graduate School of Management at Northwestern University, the University of Wisconsin at Parkside and the Pamplin College of Business at Virginia Tech, before joining Kennesaw State University in 1994. Prior to entering academia, Raj handled exports, product management and sales management functions of industrial equipment and consumer durable goods for multinational companies. He has also worked on control system design & development for military fighter jets and transport aircraft. Raj Veliyath's research and teaching interests lie in the areas of Strategic Management, International Business, Corporate Governance, Executive and Board Compensation, Planning and Control Systems, and Complexity Theory. Raj has presented and published over sixty articles and papers. His work has appeared in the *British Journal of Management*, the *Journal of Business Research*, the *Journal of Management Studies*, *Long Range Planning*, *Strategic Management Journal*, *Management International Review*, *International Business Review*, *Corporate Governance: An International Review* and other outlets. He is affiliated with the Academy of Management and the Academy of International Business. Raj can be reached at rveliyat@kennesaw.edu.

Andrew Wilson

Andrew Wilson is the founder of the management consulting business Futurestep Ltd., which specializes in change management implementation within organizations worldwide. Andrew has been helping organizations to change and improve for over ten years. Born in Scotland, but brought up in West and East Africa and continental Europe, Andrew learnt at an early age the interrelatedness of the planet he inhabited, and it is from this understanding and interest that his passion for complexity science developed. Andrew lectures for the Open University on its MBA program, and is currently developing with clients a number of design frameworks for use in organizational change, based on the principles of complexity. Andrew currently lives in North Devon with his wife Barbara and son Lucas.